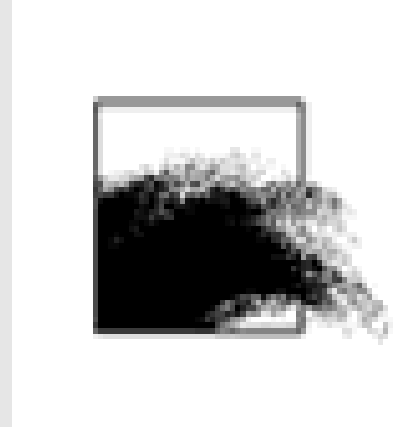


# Historical view of the macrobenthic communities on the Thorntonbank and Goote Bank

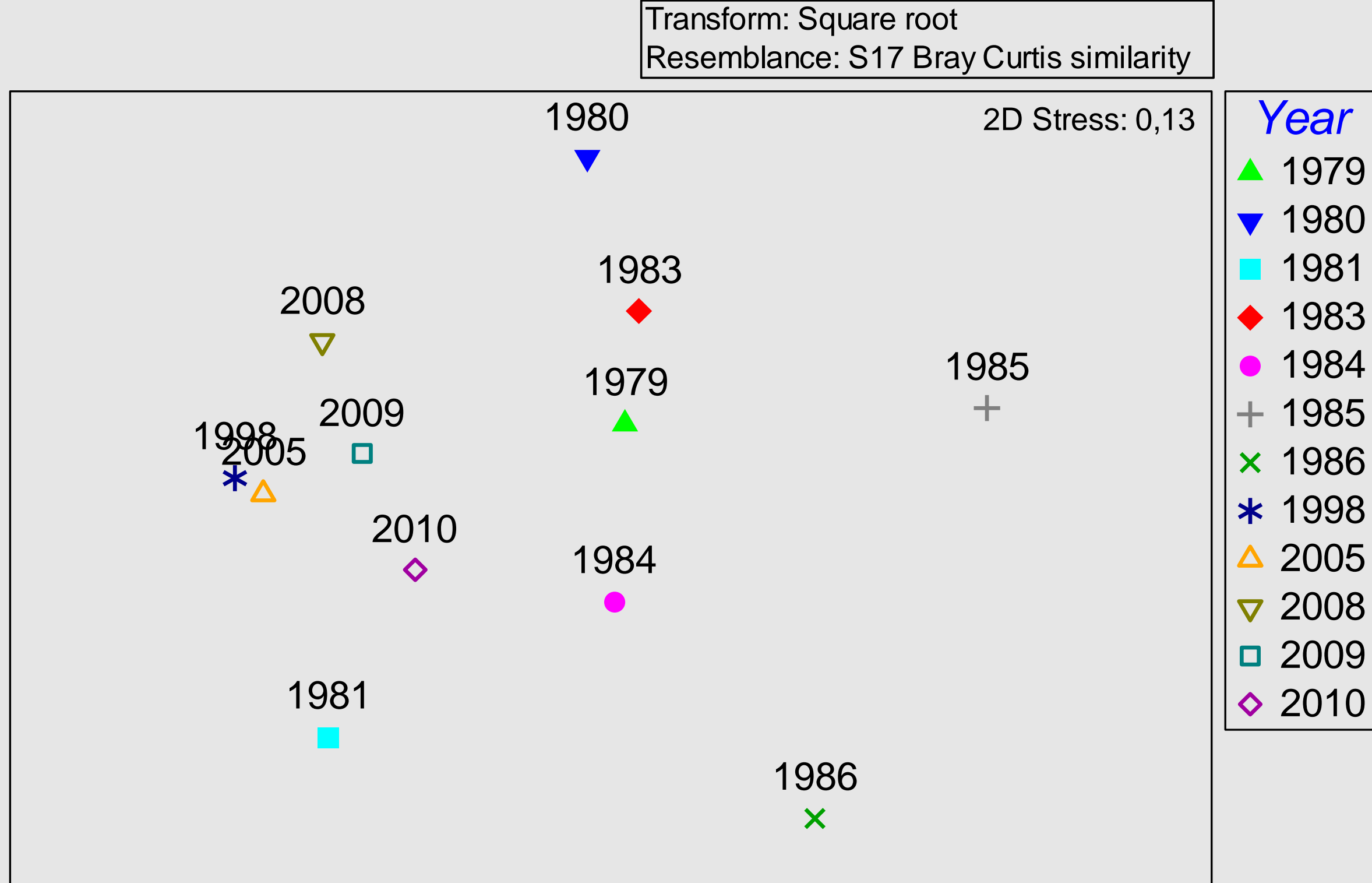


Coates Delphine \*, Vanaverbeke Jan, Vincx Magda  
Ghent University, Biology Department, Marine Biology Section



Management Unit of the North Sea  
Mathematical Models, Belgium

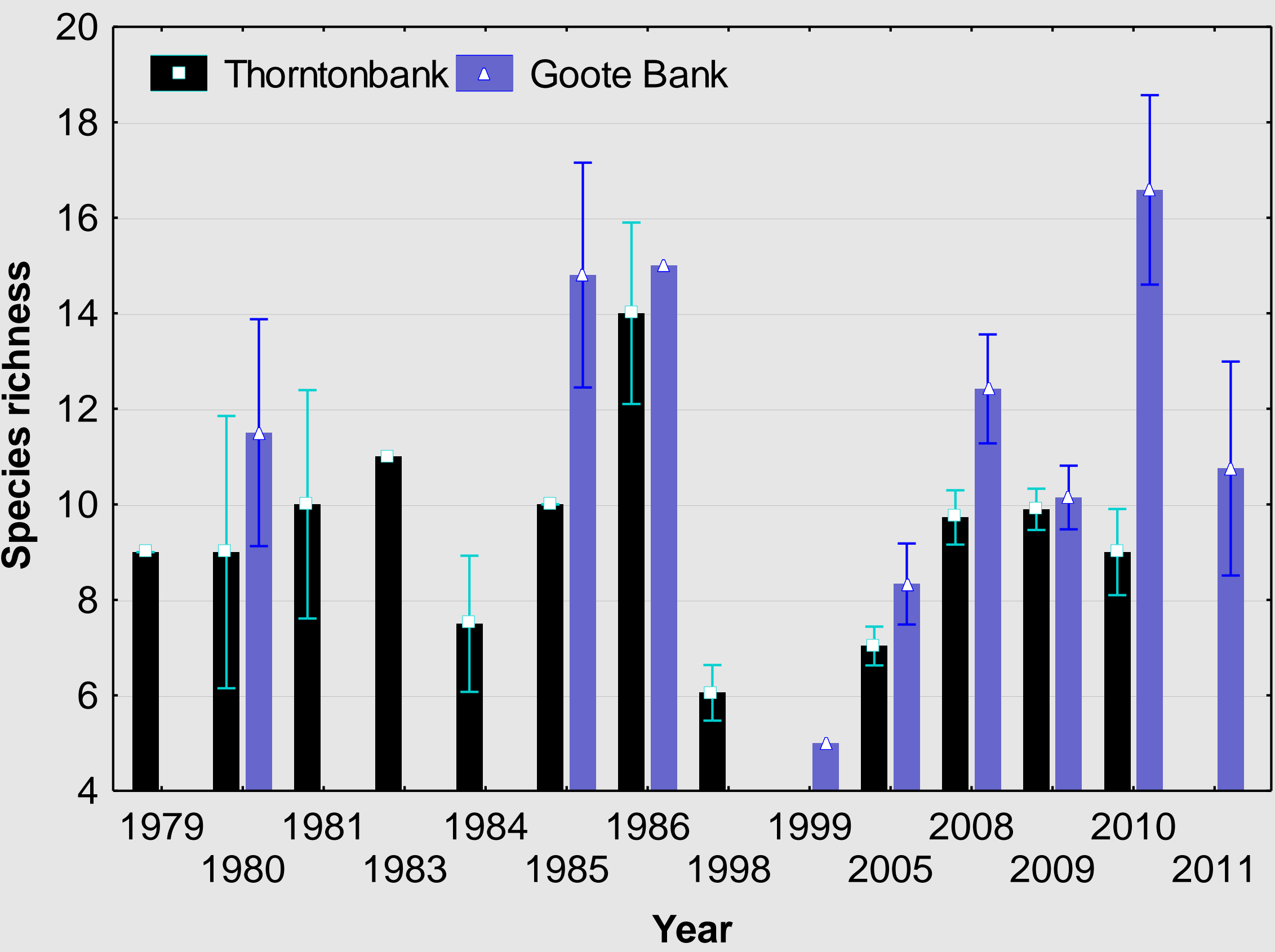
Primer v6 MDS plot averaged Thorntonbank data



Primer ANOSIM: Pairwise Tests Thorntonbank data  
Significance level < 5% , R-statistic > 0.7 (red), R-statistic < 0.7 (green)

R-statistic close to 1 → large difference between groups

	1998	2005	2008	2009	2010
1985					
1986					



Permanova, Pair-wise test among groups Year and Sandbank  
P-values > 0.05 (green), P-values < 0.05 (red)

	1980	1985	1986	2005	2008	2009	2010
Thorntonbank							
Goote Bank							

Significant difference between communities on the two sandbanks from 2008 onwards. Suggesting a first shift possibly due to preparation, sand extraction and installation activities in the Thorntonbank area

Data will be further analysed with abiotic data such as sea surface temperature, winter temperatures, salinity, median grain size and organic matter content to unravel the fluctuations in communities detected over the years

1976

Start sand extraction activities in Belgium  
Extraction zones also situated on the Thorntonbank and Goote bank

1979

Start historical data on the Thorntonbank  
1979-1986, 1998, 2005, 2008-2010

1980

Recorded North Sea regime shift

1981

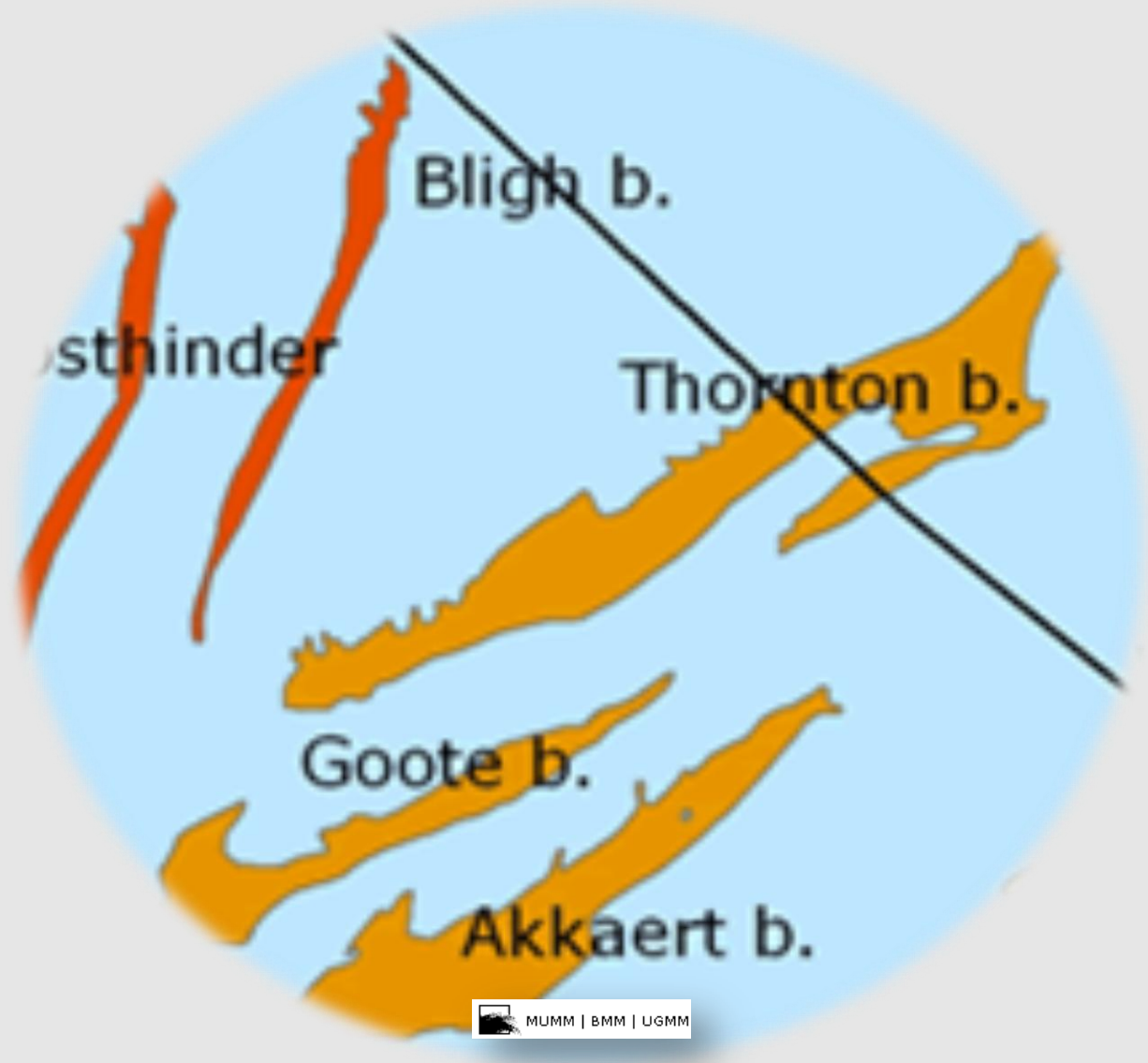
Start historical data on the Goote Bank  
1980, 1985, 1986, 1999, 2005, 2008-2011

1983

1984

1985

1986



North Sea regime shift :

Abrupt changes between contrasting, persitent states of any complex system (deYoung *et al.*, 2008)  
Drivers can be anthropogenic (eutrophication, fisheries) or naturual (salinity, severe winters, sea surface temperature, North Atlantic inflow, etc.)

1988

1998

Recorded North Sea regime shift

2005

Year-0, baseline study of the Thorntonbank for the offshore windfarm project



Preparation activities for the Thorntonbank windfarm project

2008

Installation first six gravity based wind turbines on the Thorntonbank

2009

2010

Start targeted monitoring macrobenthos around one turbine + preparation activities second phase windfarm

2011

Start second phase of wind turbine installation on the Thorntonbank